इंटरनेट मानक

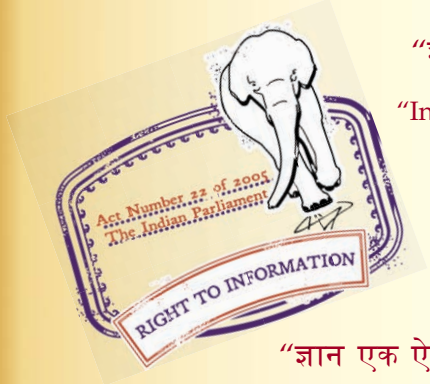
Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 10825-2 (1984): ceramic dielectric capacitors type 1: Part 2 FCCT 1 [LITD 5: Semiconductor and Other Electronic Components and Devices]



"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

BLANK PAGE

PROTECTED BY COPYRIGHT

Indian Standard (Reaffirmed 2002)

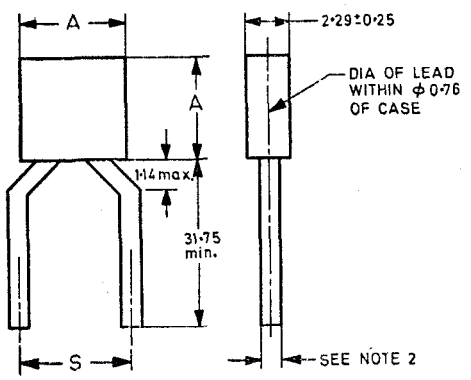
SPECIFICATION FOR CERAMIC DIELECTRIC CAPACITORS, TYPE 1

PART 2 TYPE FCCT-1

0.1 General — This standard (Part 2) shall be read in conjunction with IS : 10825 (Part 1)-1975 'Ceramic dielectric capacitors, Type 1: Part 1 General requirements and methods of tests'.

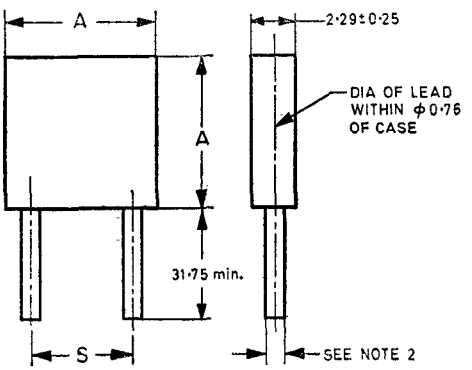
1. Scope — This standard (Part 2) covers fixed ceramic dielectric capacitors temperature compensated, moulded type insulated.

2. Outline, Drawing and Dimensions — The outline, drawing and dimensions shall be in accordance with Fig. 1 and 2 and Table 1.



All dimensions in millimetres.

FIG. 1 OUTLINE, DRAWING AND DIMENSIONS



All dimensions in millimetres.

FIG. 2 OUTLINE, DRAWING AND DIMENSIONS

Note 1 — Dimensions are in mm.

Note 2 — Lead diameter shall be 0·51 mm to 0·69 mm.

TABLE 1 DIMENSIONS

(*Clause* 2)

Case Size	*A*	*S*	Figure Reference
A	4·83 ± 0·25	5·08 ± 0·38	1
B	7·37 ± 0·25	5·08 ± 0·38	2

Adopted 23 April 1984

© April 1985, ISI

Gr 5

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Capacitors Sectional Committee, LTDC 15; Capacitors Subcommittee, LTDC 15 : 1 [Ref : Doc : LTDC 15 (500)]

TABLE 2 RATINGS

(*Clause* 3)

Nominal Capacitance	Capacitance Tolerance	Rated Voltage	Tolerance on Temperature Coefficient	Case Size
(1)	(2)	(3)	(4)	(5)
pF	±	*V*	*ppm*/°C	
1·0 1·1 1·2 1·3 1·5 1·6 1·8 2·0 2·2 2·4	0·1 *pF*, 0·25 *pF*	200	+60	A
2·7 3·0 3·3 3·6 3·9 4·3 4·7 5·1 5·6 6·2 6·8 7·5 8·2 9·1	0·1 *pF*, 0·25 *pF*, 0·5 *pF*			
10 11 12 13 15 16 18 20 22 24 27 30 33 36 39 43 47 51 56 62 68 75 82 91 100 110 120 130 150 160 180 200 220 240 270 300 330	1 percent 2 percent 5 percent		±30	

(*Continued*)

TABLE 2 RATINGS — *Contd*

Nominal Capacitance	Capacitance Tolerance	Rated Voltage	Tolerance on Temperature Coefficient	Case Size
(1)	(2)	(3)	(4)	(5)
pF	±	*V*	*ppm*/°C	
360 390 430 470 510 560 620 680 750 820 910 1 000 1 100 1 200 1 300 1 500 1 600 1 800	1 percent 2 percent 5 percent	100	±30	A
2 000 2 200 2 400 2 700 3 000 3 300	1 percent 2 percent 5 percent	50		
360 390 430 470 510 560 620 680 750 820 910 1 000 1 100 1 200 1 300 1 500 1 600 1 800	1 percent 2 percent 5 Percent	200	±30	B
2 000 2 200 2 400 2 700 3 000 3 500 3 600 3 900 4 300 4 700		100		
5 100 5 600 6 200 6 800 7 500 8 200 9 100 1 0 000 1 2 000 1 5 000 1 8 000	1 percent 2 percent 5 percent 10 percent	50		

3. Ratings and Characteristics

a)	Climatic category	55/125/56
b)	Low air pressure	8·5 kPa_2
c)	Acceleration	1 km/s
d)	Bump	4 000 bumps
e)	Vibration	10 to 2 000 Hz, 150 m/s
f)	Shock	1 km/s^2
g)	Capacitance values	*See* Table 2
h)	Selection tolerances	
j)	Rated voltage	
k)	Rated temperature coefficient	0 ppm/° C
m)	Tolerance on temperature coefficient	*See* Table 2
n)	Stability after endurance	±3 percent or 0·5 *pF* (0·25 *pF* for values < 10 *pF*) whichever is greater

4. Marking — *See* **8** of IS : 10825 (Part 1)-1975.

5. Construction and Workmanship — *See* **6** of IS : 10825 (Part 1)-1975.

6. Tests

6.1 *Classification of Tests*

6.1.1 *Type tests* — The procedure for type approval shall be in accordance with IS : 2612-1965 'Recommendation for type approval and sampling procedures for electronic components'. The sequence of type tests and requirements shall be in accordance with Table 5.

6.1.1.1 *Number of samples* — The manufacturer shall submit 24 specimens in any one temperature coefficient in each size of component for which approval is desired or a minimum of 28 specimens if approval for only one temperature coefficient in a size is desired in accordance with Table 3. The specimens shall be of the highest capacitance value and closest tolerance in each temperature coefficient.

TABLE 3 SCHEDULE OF TYPE TESTS

Group	Number of Specimens		Test
	Each Size	One Temperature Coefficient in One Size	
(1)	(2)	(3)	(4)
0	24	28	Visual examination, Dimensions, Capacitance, Tangent of loss angle, Short term stability, Voltage proof (one minute), and Insulation resistance
1	6	6	Solderability, Robustness of terminations, Bump, Vibration, Shock, Acceleration, Rapid change of temperature, and Climatic sequence
2	6	6	Damp heat (steady state)
3	6	8	Endurance
4	3	3	Resistance to solvents Resistance to soldering heat
5	2	4	Temperature coefficient and capacitance drift
Spares	1	1	

6.1.2 *Routine tests* — The following shall constitute the routine tests and shall be carried out on each and every capacitor:

a) Visual examination, and

b) Capacitance.

6.1.3 *Acceptance tests* — From the lot which has passed the routine tests, two groups of samples (Group A and B) shall beselected and the capacitors shall be subjected to the tests in accordance with Table 4.

TABLE 4 SCHEDULE OF ACCEPTANCE TESTS

Tests	AQL	Inspection* Level	D/ND
(1)	(2)	(3)	(4)
GROUP A			
Dimensions Tangent of loss angle Insulation resistance Voltage proof	1	II	ND
GROUP B			
Sub Group 1			
Short term stability Temperature coefficient and capacitance drift	4	S3	ND
Sub Group 2			
Solderability Robustness of terminations Bump Climatic Sequence	4	S3	D
Sub Group 3			
Endurance—168 hours	4	S3	ND

D : Destructive, ND : Non-destructive.

*IS : 10673-1983 'Sampling plans and procedures for inspection by attributes for electronic items'.

TABLE 5 TEST SCHEDULE AND REQUIREMENTS

(*Clause* 6.1.1)

Sl No.	Test	Clause Reference IS : 10825 (Part 1)-1975	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
i)	*GROUP O (All samples)*			
a)	Visual examination	9.4.1	—	The condition, workmanship and finish shall be satisfactory. Marking shall be legible and indelible
b)	Dimensions	9.4.2	—	Dimensions shall be in accordance with Fig. 1 and 2 and Table 1
c)	Capacitance	9.3.1	—	The capacitance value shall correspond with the rated capacitance, taking into account the tolerance
d)	Tangent of loss angle	9.3.2	—	Tan δ shall not exceed the following a) For capacitance equal to or exceeding 5 *pF* but less than 50 *pF* Tan $\delta = \left(\frac{250}{C} + 7\right) \times 10^{-4}$ b) For rated capacitance $\geq$ 50 *pF* Tan δ = 0·001

Continued

TABLE 5 TEST SCHEDULE AND REQUIREMENTS — *Contd*

Sl No.	Test	Clause Reference IS : 10825 (Part 1)-1975	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
	e) Short term stability	9.3.7	—	No random variation of frequency shall occur
	f) Voltage proof	9.3.5	At 3 times the rated voltage	There shall be no breakdown or flash-over
	1) Between terminals		The surge current shall not exceed 50mA	
	2) Between terminals connected together and the mounting plate			
	g) Insulation resistance between terminals	9.3.4	At rated voltage	*See* Appendix A
ii)	*First Group*			
	a) Solderability	9.4.4	—	—
	b) Robustness of terminations	9.4.3	Capacitors shall be held by one terminal and the load shall be gradually applied in the direction of the leads until the loads reaches 22N. The load shall be applied at least for 5 seconds	There shall be no evidence of loosening or rapture of the terminals and any other damage to the terminals and capacitors body
	c) Bump	9.4.6	4 000 Bumps	—
	1) Visual examination	9.4	—	There shall be no mechanical deterioration
	2) Capacitance	9.3.1	—	The change in capacitance from the initial value shall not exceed ±2 percent or 0·5 *pF* (0·25 *pF* for values less than 10 *pF*) whichever is greater
	3) Tangent of loss angle	9.3.2	—	As in Sl No. (i) (d)
	4) Insulation resistance	9.3.4	—	As in Sl No. (i) (g)
	d) Vibration	9.4.5	10 to 2 000 Hz 150 m/s^2	
	1) Visual examination	9.4	—	There shall be no mechanical deterioration
	2) Capacitance	9.3.1	—	The change in capacitance from the initial value shall not exceed ±2 percent or 0·5 *pF* (0·25 *pF* for values less than 10 *pF*) whichever is greater
	3) Tangent of loss angle	9.3.2	—	As in Sl No. (i) (d)
	4) Insulation resistance	9.3.4	—	As in Sl No. (i) (g)
	e) Shock	As in IS : 9000 (Part 7/ Sec 1)-1979*	1km/s^2	—
	1) Visual examination	9.4	—	There shall be no mechanical deterioration
	2) Capacitance	9.3.1	—	The change in capacitance from the initial value shall not exceed ±2 percent or 0·5 *pF* (0·25 *pF* for values less than 10 *pF*) whichever is greater
	3) Tangent of loss angle	9.3.2	—	As in Sl No. (i) (d)
	4) Insulation resistance	9.3.4	—	As in Sl No. (i) (g)

*Basic environmental testing procedures for electronic and electrical items: Part 7 Impact test, Section 1 Shock.

(*Continued*)

TABLE 5 TEST SCHEDULE AND REQUIREMENTS — *Contd*

Sl No.	Test	Clause Reference IS : 10825 (Part 1)-1975	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
	f) Acceleration	As per IS : 9000 (Part 9)-1984*	1 km/s²	—
	1) Visual examination	9.4	—	There shall be no mechanical deterioration
	2) Capacitance	9.3.1	—	The change in capacitance from the initial value shall not exceed ±2 percent or 0·5 *pF* (0·25 *pF* for values less than 10 *pF*) whichever is greater
	3) Tangent of loss angle	9.3.2	—	As in Sl No. (i) (d)
	4) Insulation resistance	9.3.4	—	As in Sl No. (i) (g)
	g) Rapid change of temperature	9.5.3	55/125	—
	1) Visual examination	9.4	—	There shall be no fracture or other mechnical deterioration
	2) Capacitance	9.3.1	—	The change in capacitance from the initial value shall not exceed ±5 percent or 0·5 *pF* (0·25 *pF* for values less than 10 *pF*) whichever is greater
	3) Tangent of loss angle	9.3.2	—	As in Sl No. (i) (d)
	4) Insulation resistance	9.3.4	—	As in Sl No. (i) (g)
	h) Climate sequence			
	1) Dry heat	9.5.1.2	At +125°C	—
	i) Insulation resistance (hot)	9.3.4	—	As in Sl No. (i) (g)
	ii) Capacitance	9.3.1	—	The change in capacitance from the initial value shall not exceed ±5 percent or 0·5 *pF* (0·25 *pF* for values less than 10 *pF*) whichever is greater
	2) Damp heat cyclic	9.5.1.3	One cycle	
	3) Cold	9.5.1.4	—55°C	
	i) Working test	—	During the last 10 minutes of exposure, the rated voltage shall be applied to the specimens	There shall be no breakdown or flash-over
	4) Low air pressure	9.5.1.5	8·5 kPa. During the last minute the rated voltage shall be applied	
	5) Damp heat cyclic	9.5.1.6	Remaining cycles	There shall be no breakdown or flash-over
	i) Working test	—	Within 15 minutes after removal from the chamber, and before the recovery period, the rated voltage shall be applied for 5 minutes	
	j) Final measurements			
	a) Visual examination	9.4	—	There shall be no corrosion, fracture or other mechanical deterioration. Marking shall be legible and indelible
	b) Voltage proof	9.3.5	—	There shall be no breakdown or flash-over

*Basic environmental testing procedures for electronic and electrical items: Part 9 Acceleration (steady state) test.

(*Continued*)

TABLE 5 TEST SCHEDULE AND REQUIREMENTS — *Contd*

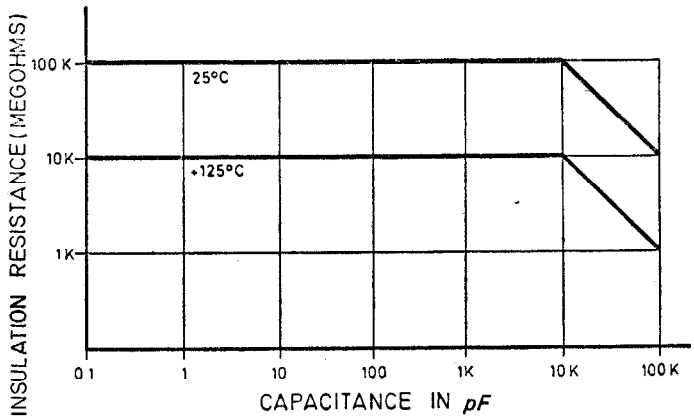
Sl No.	Test	Clause Reference IS : 10825 (Part 1)-1975	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
	c) Insulation resistance	9.3.4	To be completed within one hour after recovery	The value shall be not less than 50 percent of the initial value
	d) Capacitance	9.3.1	—	The change in capacitance from the initial value shall not exceed ±5 percent or 0·5 *pF* (0·25 *pF* for values less than 10 *pF*) whichever is greater
	e) Tangent of loss angle	9.3.2	—	As in Sl No. (i) (d)
iii)	*Second Group*			
	a) Damp heat (Steady state)	9.5.2	56 days	—
	1) Electrical loading	—	a) Throughout the period of exposure one-half of the specimens shall have the rated voltage applied between the terminations	There shall be no breakdown or flashover
			b) Within 15 minutes after removal from the chamber the remaining specimens shall have the rated voltage applied between the terminations for 5 minutes	There shall be no breakdown or flashover
	2) Visual examination	9.4	—	There shall be no corrosion, fracture or other mechanical deterioration. Marking shall be legible and indelible
	3) Voltage proof	9.3.5	—	There shall be no breakdown or flashover
	4) Insulation resistance	9.3.4	—	The value shall be not less than 30 percent of the initial value
	5) Capacitance	9.3.1	—	The change in capacitance from the initial value shall not exceed ±5 percent or 0·5 *pF* (0·25 *pF* for values less than 10 *pF*) whichever is greater
	6) Tangent of loss angle	9.3.2	—	As in Sl No. (i) (d)
	7) Solderability	9.4.4	—	
iv)	*Third Group*			
	a) Endurance test	9.6	At +125°C	
	1) Visual examination	9.4	—	There shall be no fracture, or any other mechanical deterioration. Marking shall be legible and indelible
	2) Capacitance	9.3.1	—	The change in capacitance from the initial value shall not exceed ±3 percent or 0·5 *pF* (0·25 *pF* for values less than 10 *pF*) whichever is greater
	3) Tangent of loss angle	9.3.2	—	As in Sl No. (i) (d)
	4) Voltage proof	9.3.5	—	As in Sl No. (i) (f)
	5) Insulation resistance	9.3.4	—	The value shall be not less than 50 percent of the initial value
v)	*Fourth Group*			
	a) Resistance to solvents	As in IS : 9000 (Part 20)-1979*	—	The marking shall remain legible and shall not smear or rub off. There shall be no visible indication of damage or deterioration of the capacitor body
	b) Resistance to soldering heat	9.4.4	—	—
	1) Visual examination	9.4	—	There shall be no mechanical damage
	2) Capacitance	9.3.1	—	The change in capacitance from the initial value shall not exceed ±5 percent
	3) Tangent of loss angle	9.3.2	—	As in Sl No. (i) (d)
	4) Insulation resistance	9.3.4	—	As in Sl No. (i) (g)
vi)	*Fifth Group*			
	a) Temperature coefficient	9.3.3	—	The value of temperature coefficient shall be as given in 3 (j)
	b) Capacitance drift	9.3.3	—	The value shall be within ±0·2 percent or 0·5 *pF* whichever is greater

*Basic environmental testing procedures for electronic and electrical items: Part 20 Resistance to cleaning solvents and permanence of markings.

APPENDIX A

[Table 5, Sl No. (i) (g)]

INSULATION RESISTANCE



Printed at Printrade, New Delhi, India